SANYO

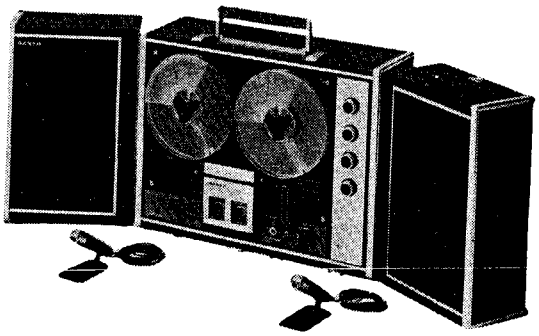
Stereo Tape Recorder

MODEL MR-939

SERVICE MANUAL

SANYO ELECTRIC CO., LTD.

INTERNATIONAL DIVISION: SANYO ELECTRIC TRADING CO., LTD.
OSAKA, JAPAN



SPECIFICATIONS

Speed Accuracy ·····±3% Standard (7-1/2, 3-3/4 or 1-7/8 ips)
Speed Variation ·····2% Max. (Start to end of reel)
Wow·····0.15% Max. 7-1/2 ips (WRMS Value)
0.20% Max. 3-3/4 ips (WRMS Value)
0.30% Max. 1-7/8 ips (WRMS Value)
Rewind/Fast Forward ·····Up to 2 min. for 1200 ft. on 7 in. reel
Sensitibity
Microphone Input···−67 to −73 dBm for standard Rec. level on meter
AUX Input·····−17 to −23 dBm for standard Rec. level on meter
Power Output (10% Dist.)···3 Watts each channel
Cross-Talk,
Channel to Channel···Better than 60 dB
Bias Frequency ·····80 Kc
Erase Efficiency ·····At least 60 dB
Signal Noise Ratio·····Better than 38 dB without Weighting Network
Hum and Noise ·····30 mV Max. Volume and Tone Max.
Gain Balance, CH-CH ·····2 dB max. difference (overall record/play)
Frequency Responce
Record-Play···

SPEED	FREQUENCY c/s				
	100	1000	3000	5000	10000
7-1/2 ips	+7 −3	0	—	—	+3 −7
3-3/4 ips	+6 −4	0	—	+6 −6	—
1-7/8 ips	—	0	+6 −6	—	—

Reel Torque (gr-cm) ·····

MODE	LEFT	RIGHT
PLAY	30 - 60	100 - 150
REW.	450 - 550	40 - 60
F. FOW.	30 - 60	500 - 700

Pinch Roller Pressure ·····900-1300 gr

DISASSEMBLY

To Disassemble:
Step 1. Pull off control knobs.
Step 2. Remove nuts of the headphone and microphone jacks.
Step 3. Remove tape speed selector knob.
Step 4. Remove set-screws and pull off control lever.
Step 5. Remove head-housing.
Step 6. Remove screws (five) fixing front panel, and remove panel.
Step 7. Remove screws (two) fixing chassis to top of cabinet.
Step 8. Remove screws (four) fixing chassis to rear of cabinet.

Remove chassis carefully.

To Reassemble:
Reverse disassembly sequence.

For sub-disassembly and sub-reassembly refer to illustrations in replaceable parts list.

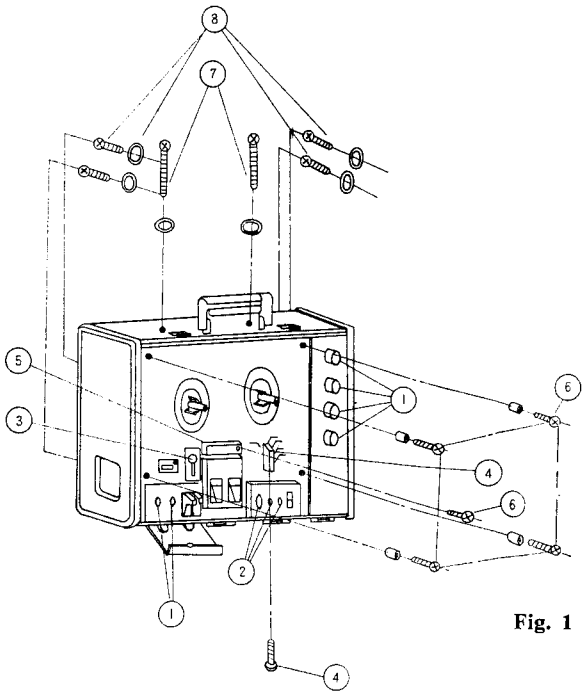


Fig. 1

MECHANICAL ADJUSTMENTS

Pressure Roller Tension

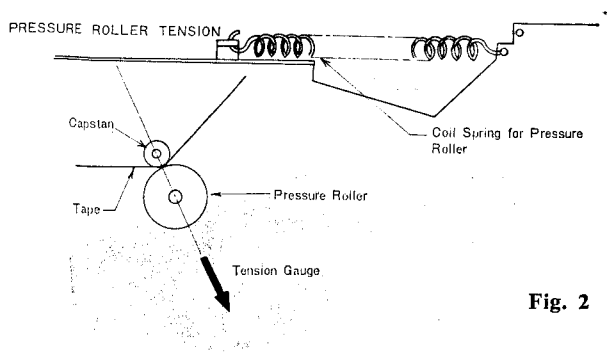


Fig. 2

Measurement (refer to fig. 2)

Pressure between the pressure roller and capstan should be gauged; satisfactory tension is between 900 and 1300 grams. To take the reading, play the tape then pull the pressure roller away from capstan until the tape stops and read the tension gauge. This process should be repeated two or three times.

Adjustment (refer to fig. 2)

Adjust the pressure roller spring. If spring tension is too weak, cut the spring 1 or 2 turns shorter or hook it to the next hole.

If spring tension is too strong, stretch the spring throughout its length.

Winding Torque For Play, Rewind & Fast Forward

Prepare an empty reel (1-3/4″ hub) with a few turns of thread and hook a tension gauge (150-450 grams) to its end.

Measurement (refer to fig. 3)

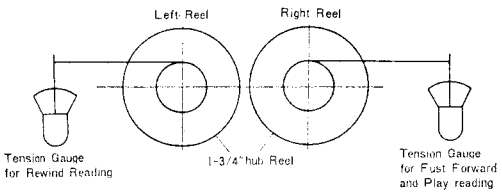


Fig. 3

Operated in each mode. Pull the thread in the opposite direction, and reed the gauge when the reel stops. Repeat each reading several times. Normal torque should be as follows:

	LEFT REEL	RIGHT REEL
FAST FORWARD	1.0 — 1.2 ozs	1.1 — 1.5 lbs
REWIND	1.0 — 2.1 lbs	1.4 — 2.1 ozs
PLAY	1.0 — 2.1 ozs	3.5 — 5.3 ozs

Adjustment

Forward & Playback

Unsatisfactory take-up torque could be caused by a worn belt, dirty take-up or motor pulley, worn or oily felt washer, or incorrect take-up torque.

1. Check the belt and take-up idler for wear and/or dirt. Change the belt if necessary, cleaning the motor pulley and take-up idler.
2. If the belt is in good condition check the felt washer for oil or wear.
3. If the felt washer is in good condition, check the springs. Bend the springs or change the thickness of the nylon washer to increase or decrease take-up torque.

Rewind

Insufficient rewind torque could be caused by worn belt or incomplete travel of the rewind roller lever.

Adjust the nut of the action rod so that the rubber rewind roller firmly presses against the motor pulley.

Tape Pad Pressure

Set the unit in Play mode. Press the tension gauge against the top of the tape pad plate. Read the tension gauge at the moment when the tape pads separate from the heads.

Normal pressure at the top of the tape pads should be 0.7–1.4 ozs.

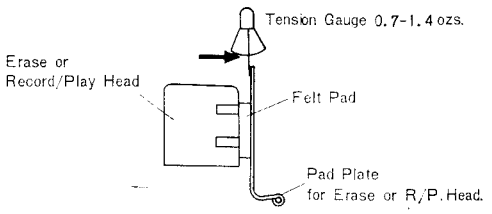
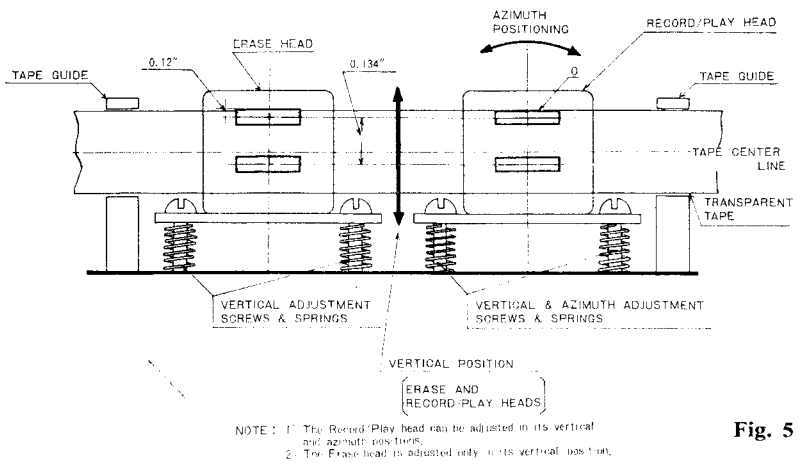


Fig. 4

ADJUSTMENT OF HEAD HIGHT & AZIMUTH



NOTE : 1. The Record/Play head can be adjusted in its vertical and azimuth positions.
2. The Erase head is adjusted only in its vertical position.

Fig. 5

HEAD ADJUSTMENTS

Relative Position of Heads and Tape (refer to fig. 5)

Thread the recorder with tape and set in Playback mode. Pull back the tape pads and adjust the relative position of the heads and tape (see fig. 5) by turning the adjustment screws for each head. The erass head does not require precise azimuth positioning.

Record/Playback Head

Connect a VTVM to one speaker jack and play a 4-track standard alignment tape (7000 c/s). Turn the adjustment screws until maximum meter reading is obtained. Check the other channel for a similar meter reading and readjust the first channel slightly if necessary to obtain equal output.

Recording Level

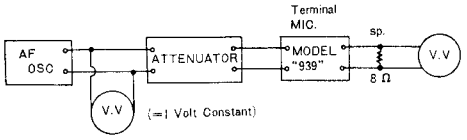


Fig. 6

Connect as shown in fig. 6.

Connect the attenuator to the recorder Aux. input then connect the recorder speaker jacks to the VTVM via a parallel resistor (8 ohms). Set in Record mode and turn the volume control to maximum and the tone control to the monitor position until a click is heard.

Adjust the AF oscillator to produce 1 volt at 1000 c/s on the VTVM, and regulate the attenuator output for −66 dB at 1000 c/s.

This signal is fed into the microphone jack of the recorder. Adjust VR-1 & VR-101 to read 0.8 V on the VTVM.

The VU meter is then calibrated at 0-VU for this output level. Adjustment of VU meter is done using SVR-2 and SVR-102.

ELECTRICAL ADJUSTMENTS

Bias Oscillator Frequency (fig. 7).

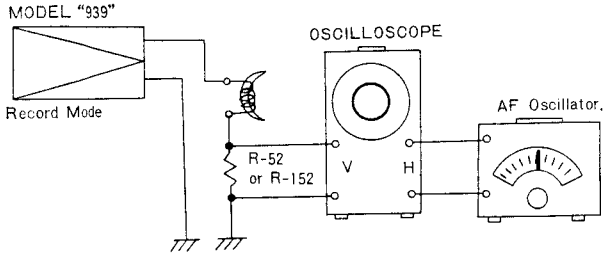


Fig. 7

Connect a 10 ohm resistor (R52 or R-152) in series with the ground lead wire of the Record / Playback head as shown in Fig. 7.

Connect the vertical input of an Oscilloscope across a resistor; connect the horizontal input of the Oscilloscope to the output terminal of the audio frequency oscillator (A.F. Oscillator).

When the unit is set in Record mode and connected as above, a lissajous figure will appear on the oscilloscope.

Standard frequency is 80 Kc ± 5 Kc.

It is only necessary to measure one channel. If the frequency is not within the above range, change the oscillator coil or C-206 (0.002μF).

Bias Current (Fig. 8)

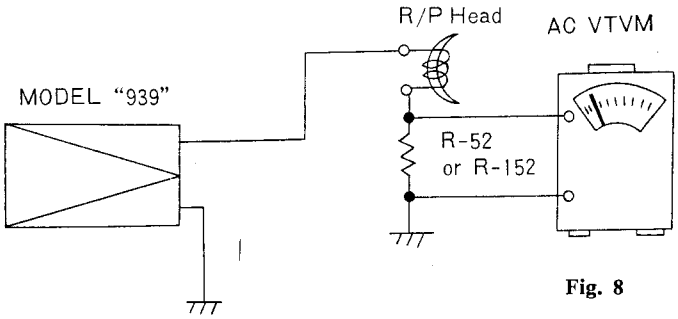


Fig. 8

Proper bias is necessary for optimum recording. Adjust the bias oscillator frequency as described before. Bias current during the recording is measured at both ends of R52 (CH-1) or R152 (CH-2). Adjustment is made by a semifixed CT-1, CT-101 so the voltage will be 2 mV on an AC VTVM. Recording bias current is 0.9 mA (voltage across the 10 ohm resistor; $0.9\ mA \times 10^{-3} \times 10 = 0.009\ V$).

MAINTENANCE

Oiling and Cleaning

All rotating parts of this set are permanently lubricated.

To ensure smooth functioning, oil-less metal parts are sealed from exposure to air. Accordingly, these parts must be disassembled before reapplying lubricant. This tape recorder does not as a rule require oiling, however, it is preferable to oil once year or when parts are repaired, as follows:

Pressure Roller	1 drop
Flywheel Shaft	2 drops
Rewind Roller	1 drop
Motor Shaft	2 drops
Reel Base and Reel Base Pulley	1 drop
Counter and Shaft	1 drop
Rewind Idler	1 drop

If excessive oil is applied it may overflow along the shaft and adhere to the rubber parts of the belt and pressure roller, causing slipping, wow or flutter.

Care should be taken to limit the amount of oil applied.

Cleaning the Tape Transport Sections

The tape travels from the feed reel to the pinch roller through two tape guides, an erasing head, a recording head, pad, tape guide and capstan.

When dust or ferrous powder on the tape adheres to these parts, insufficient erasing, non-recording, poor high tones, reduced volume and slipping may result, so the utmost care should be taken when cleaning these parts.

Parts such as the tape guides, each head, the pinch roller and capstan should be thoroughly cleaned with a soft cloth or gauze moistened in alcohol or head cleaning solution.

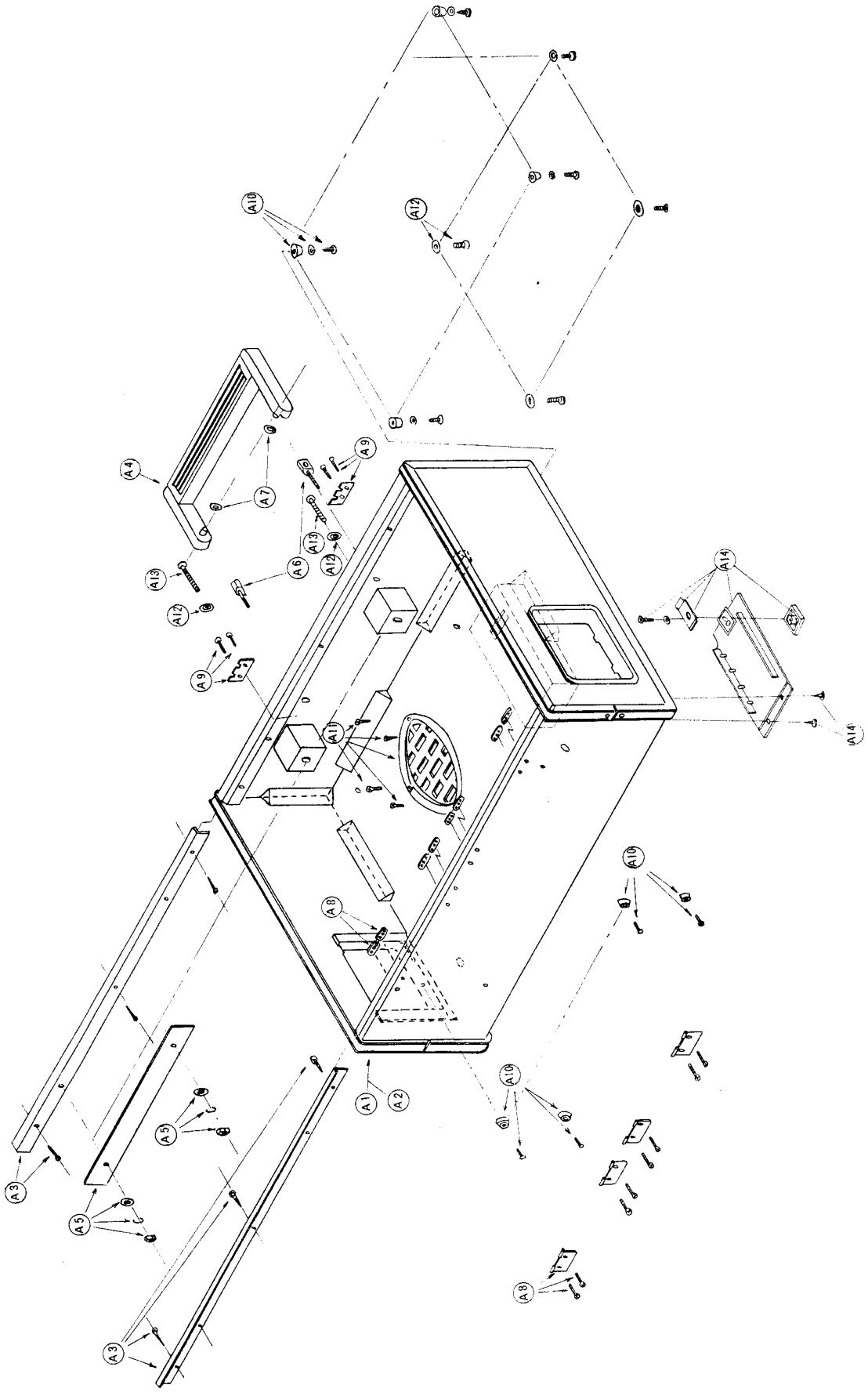
Head De-Magnetization

Magnetization of the heads may result when the continuity of the heads is measured with an ohm meter. If it is necessary to measure head continuity, the heads should be de-magnetized after continuity check.

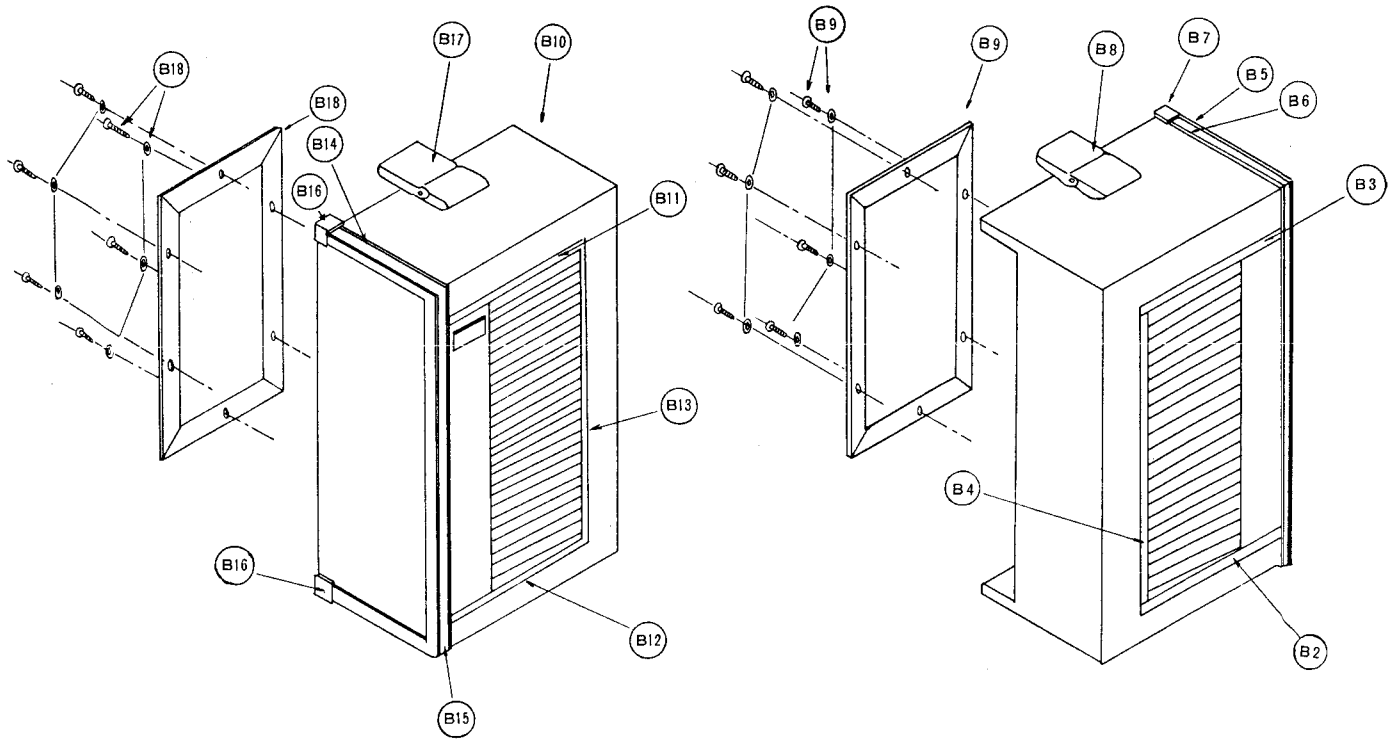
A magnetized head can be neutralized with the use of a standard de-magnetization tool. The tip of the tool should not be used through the pad, but should be thin enough to fit between the pressure pad and the head. A piece of cellulose tape should be placed over the head of the tool to prevent metal to metal contact between the tool and the head.

After de-magnetization, slowly remove the tool from the vicinity of the head before turning off the current.

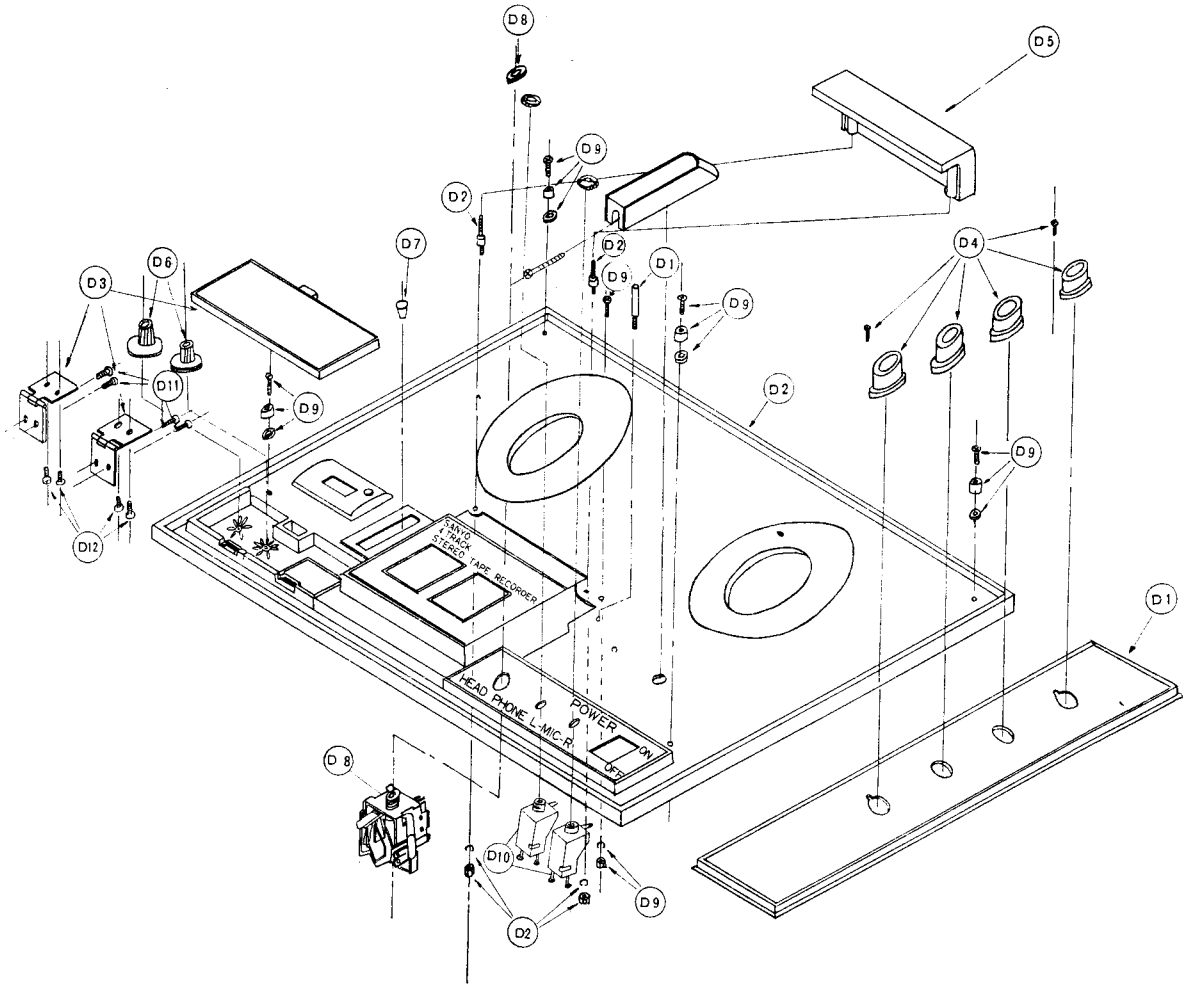
CABINET


A10
A12
A4
A7
A9
A13
A6
A12
A13
A12
A9
A14
A14
A11
A10
A8
A10
A1
A2
A5
A3
A5
A8
A3

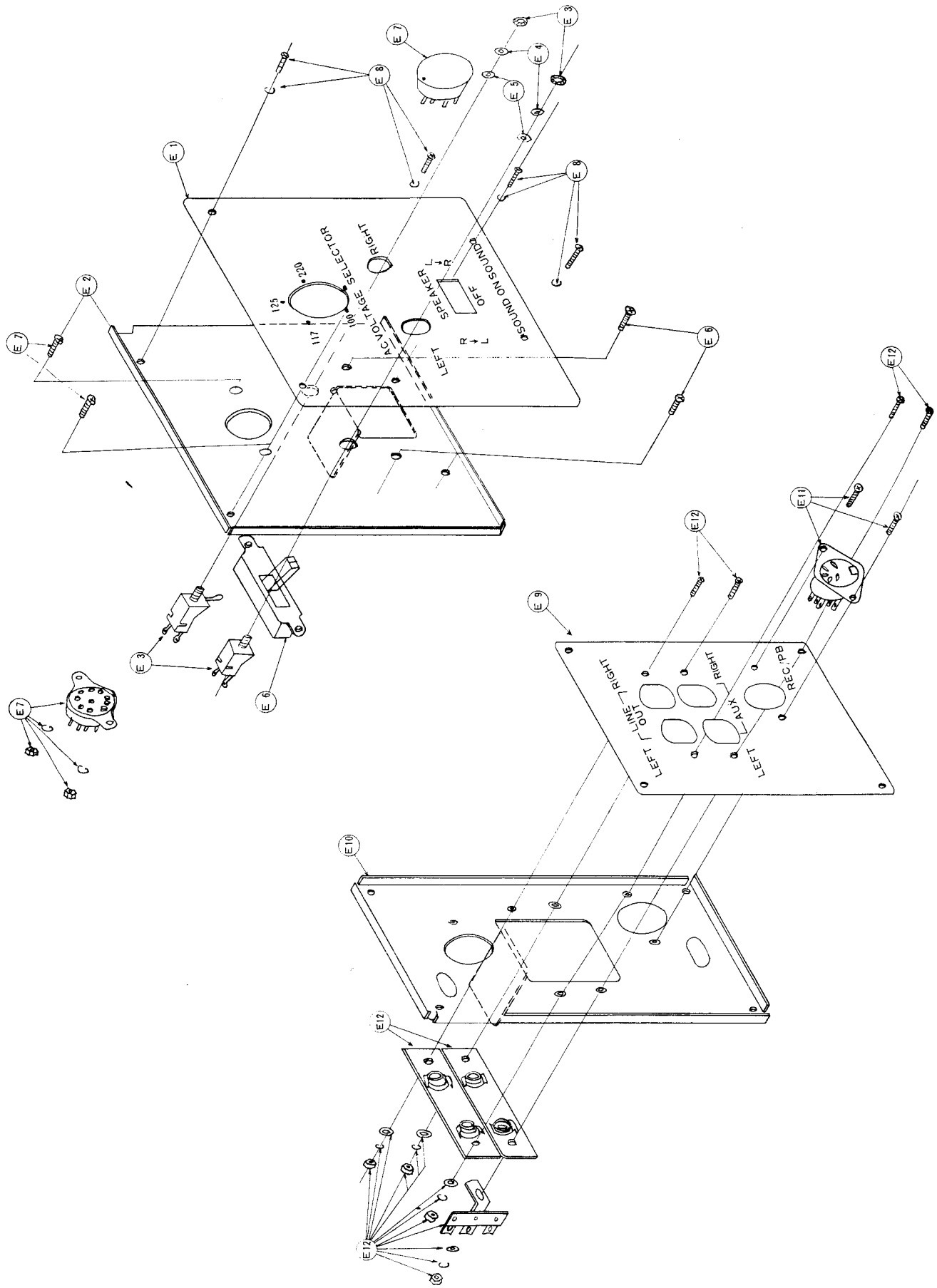
SPEAKER BOX



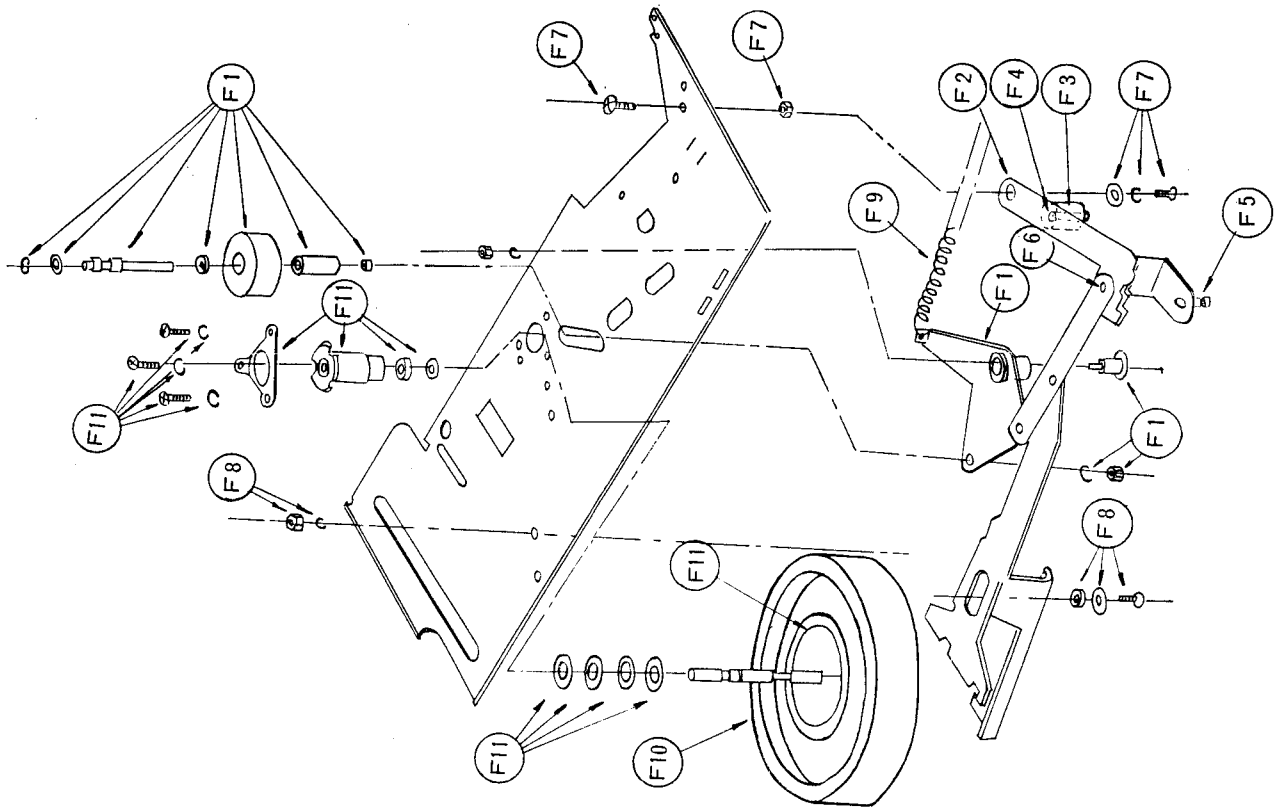
FUNCTION PANEL



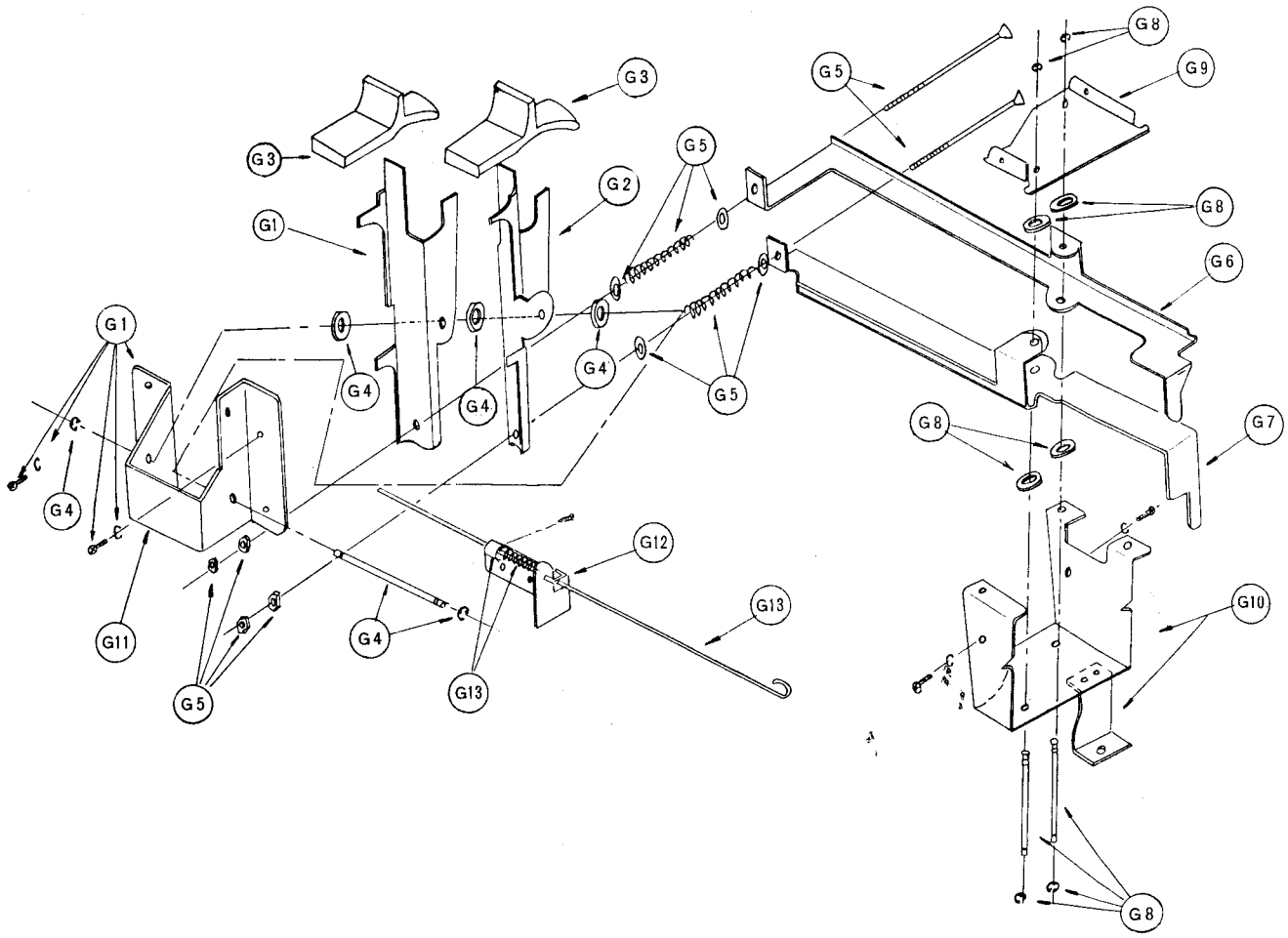
JACKS & INSULATOR



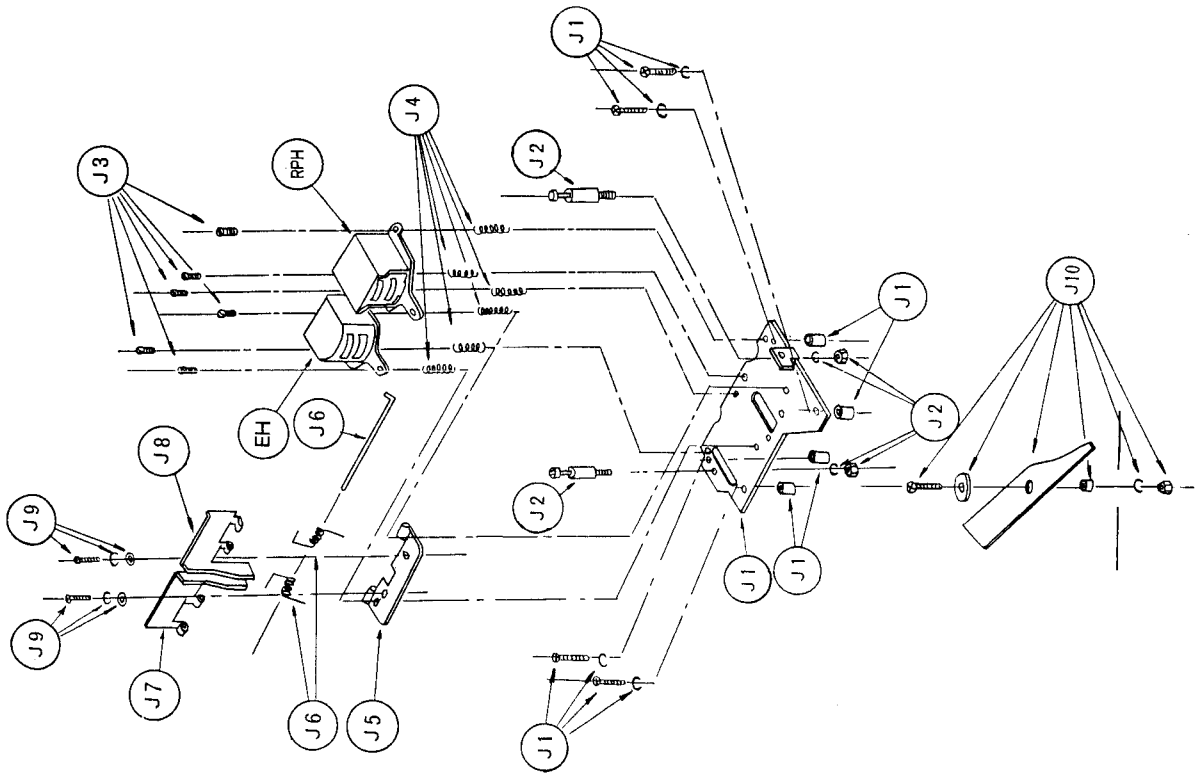
CAPSTAN MECHANISM



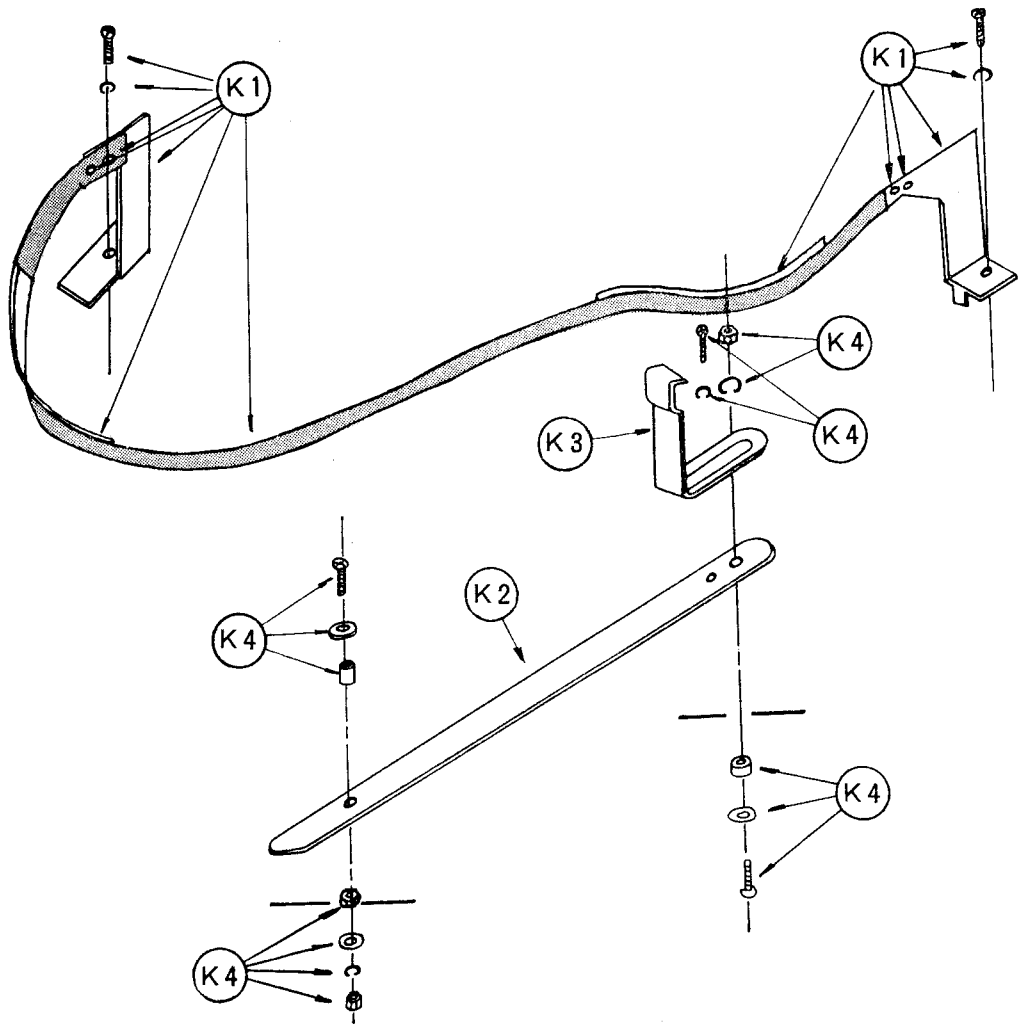
RECORDING MECHANISM



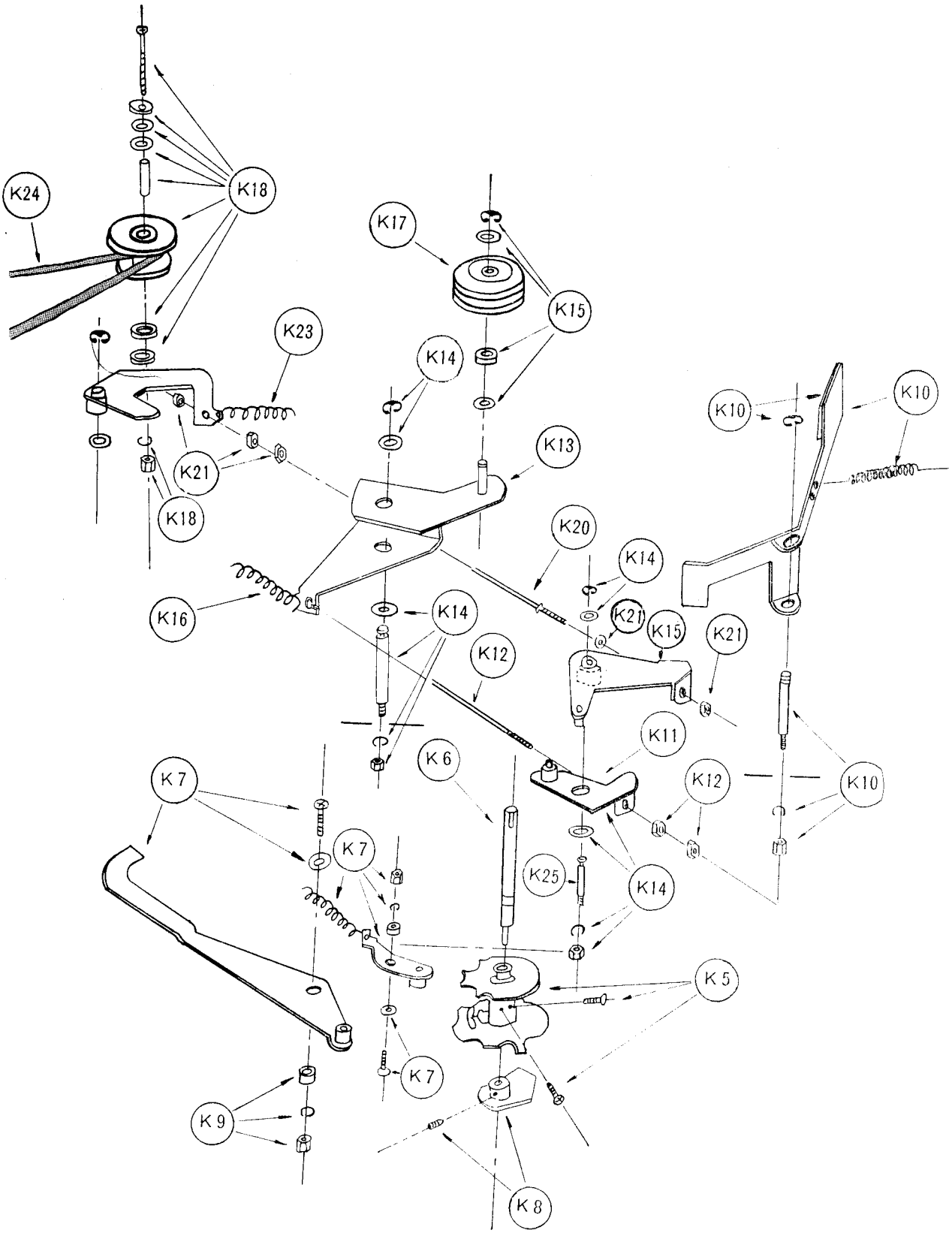
HEAD SYSTEM



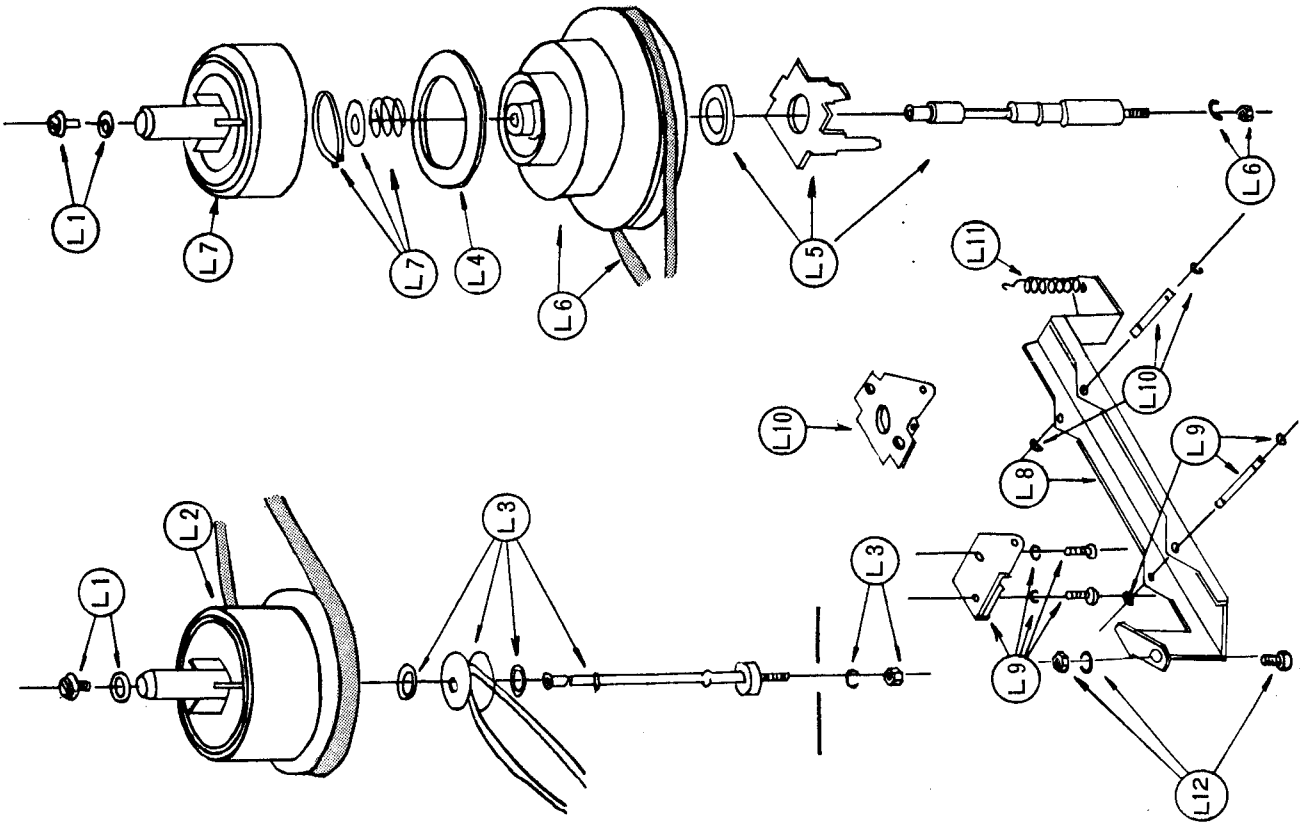
OPERATION MECHANISM



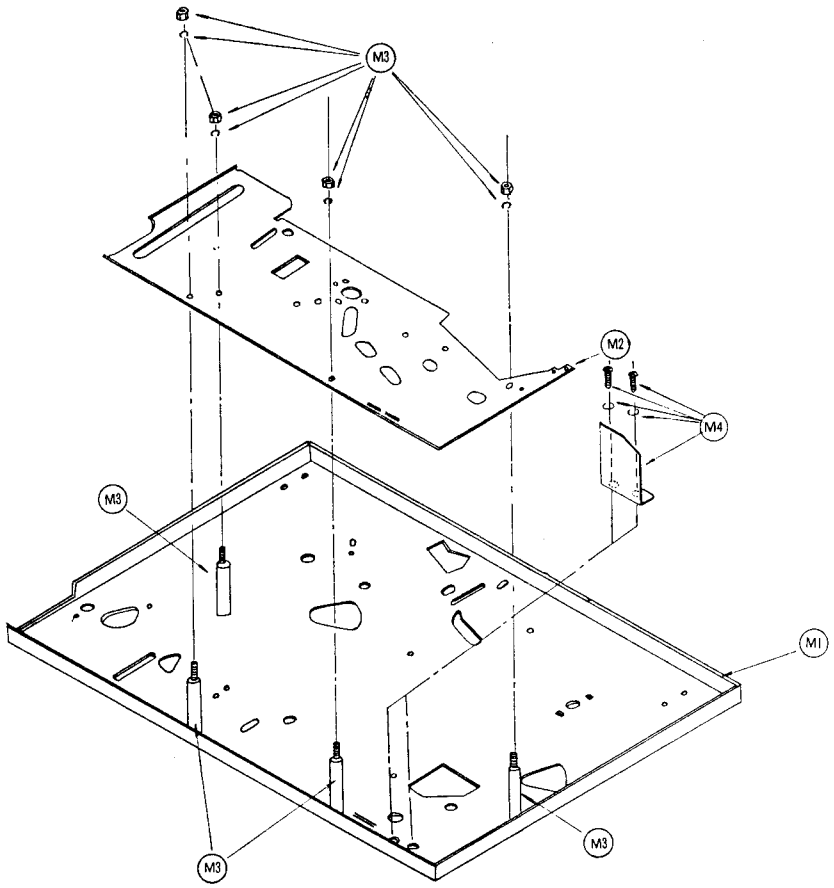
OPERATION MECHANISM



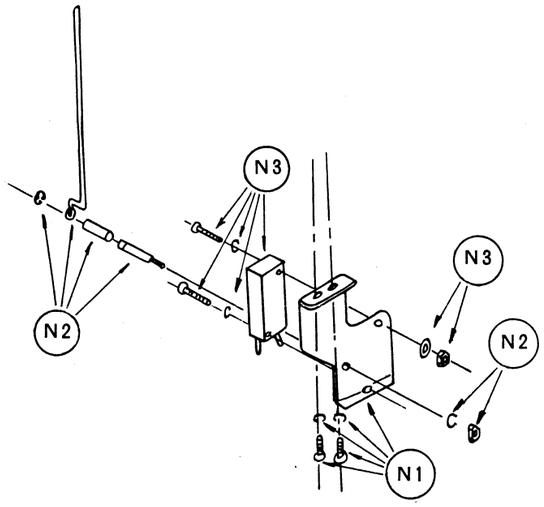
TAKE-UP & SUPPLY REEL DISK



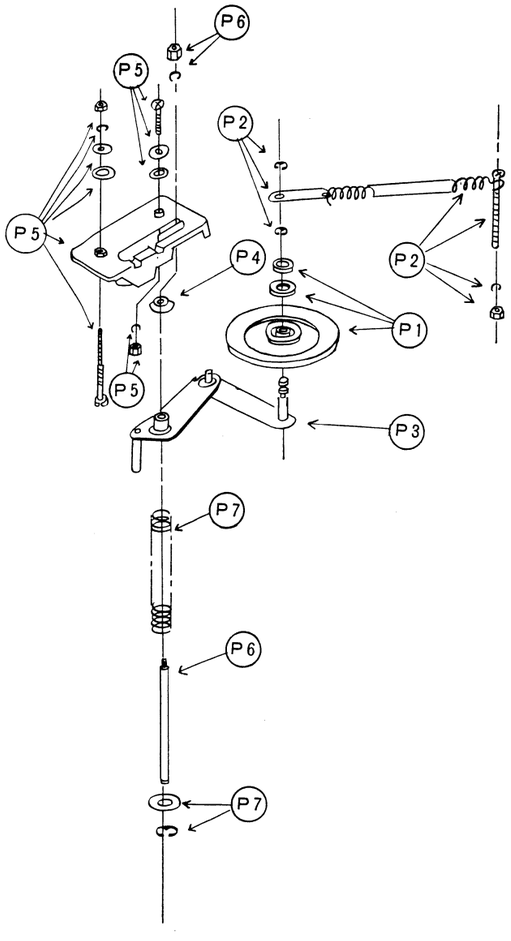
MECHANICAL DECK & CHASSIS



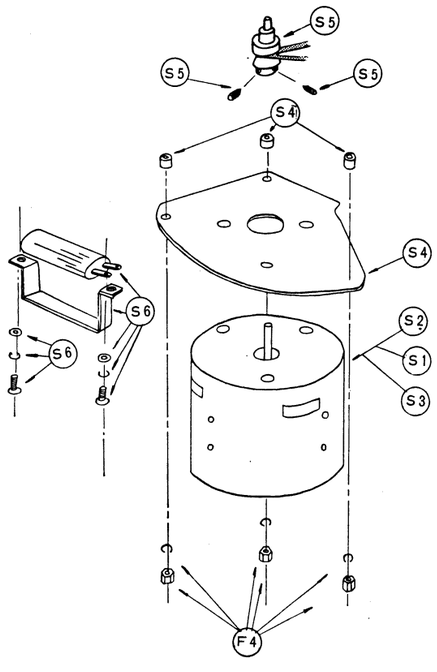
AUTOMATIC STOPPER



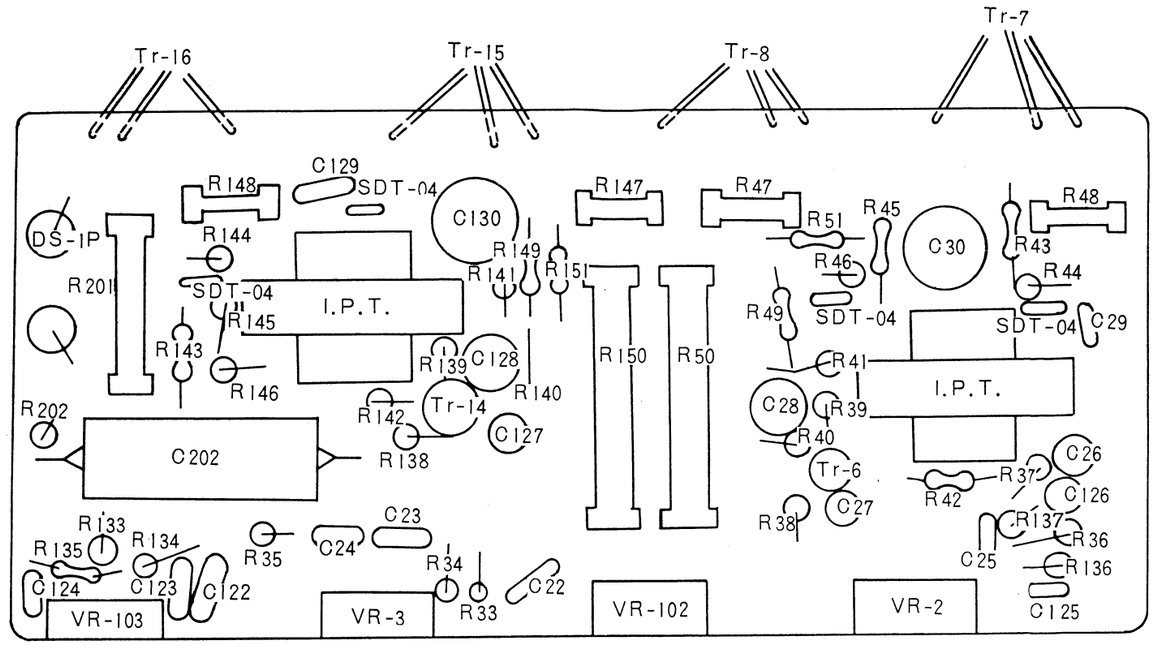
SPEED CHANGE MECHANESM

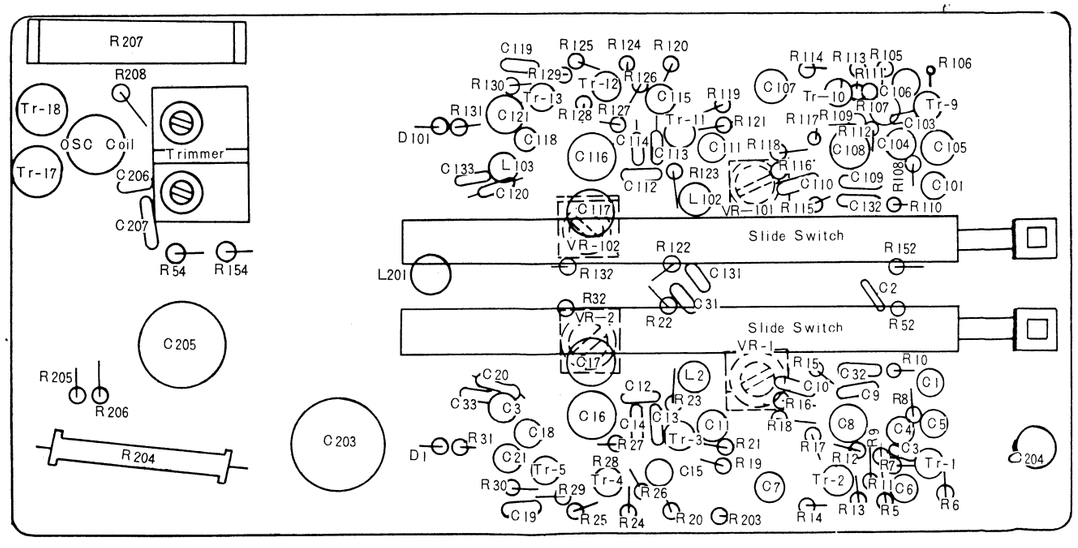


MOTOR

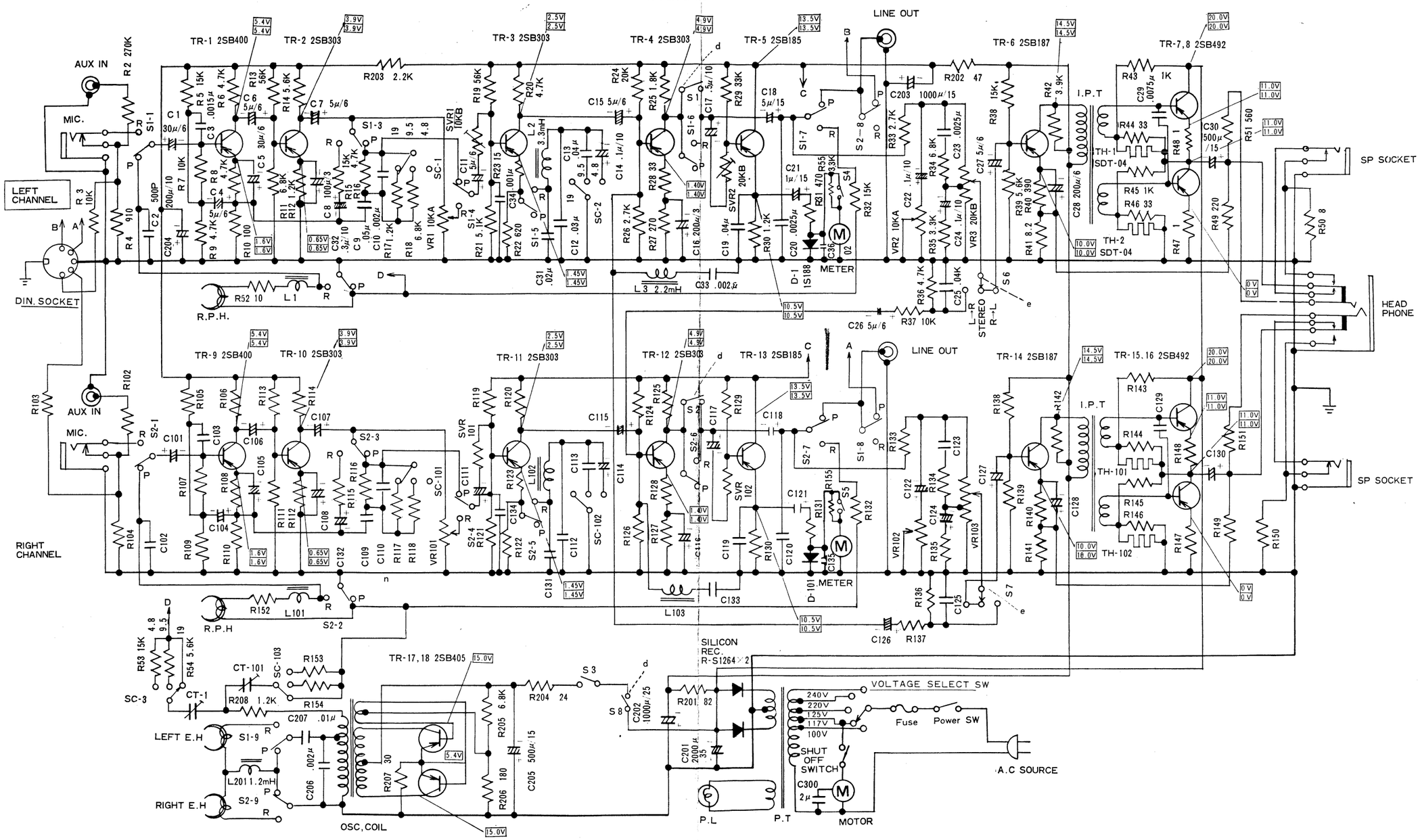


MAIN PARTS LOCATION



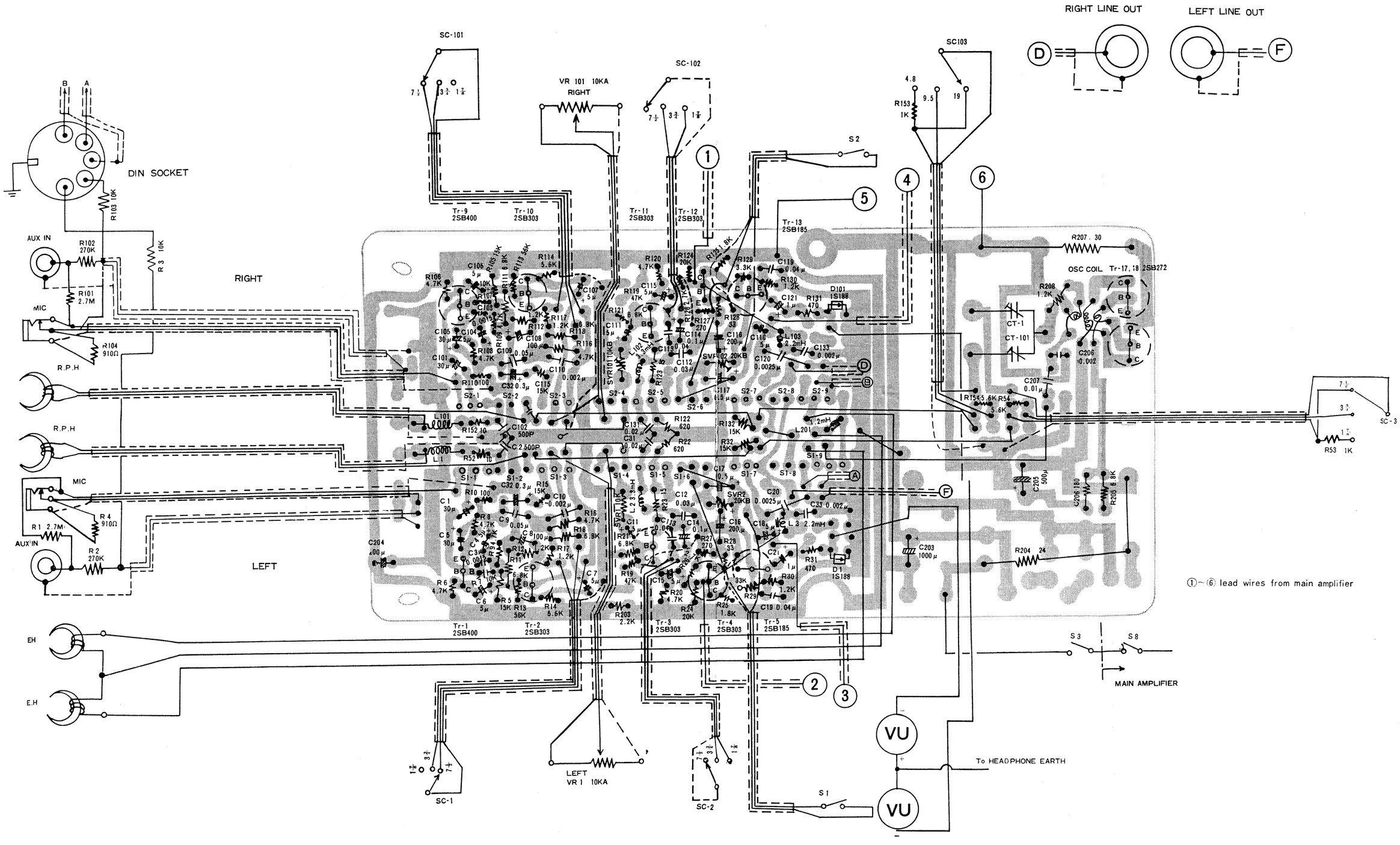


CIRCUIT DIAGRAM

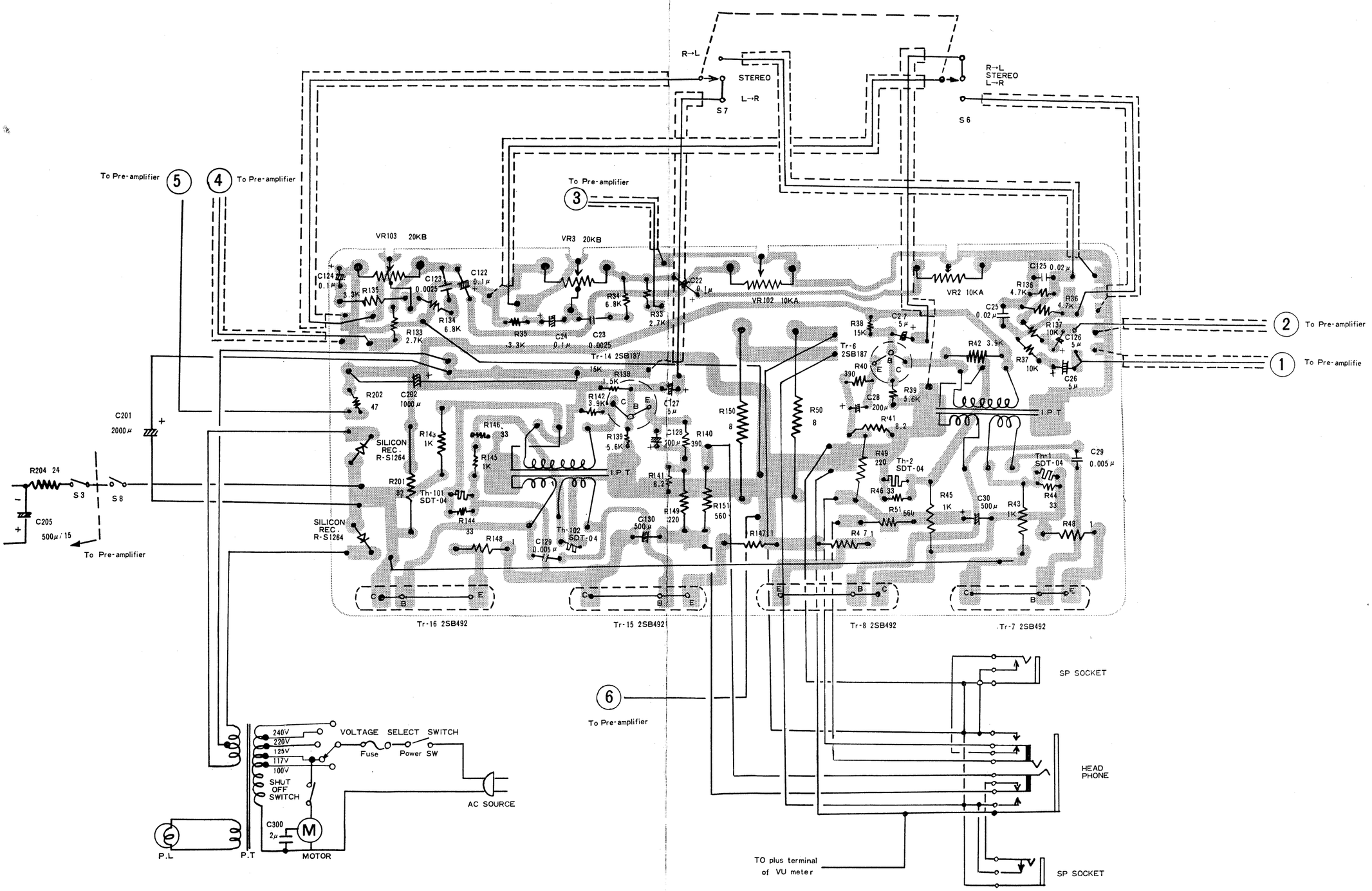


S1-1 ~S1-9, S2-1 ~S2-9 , R.P SWITCH
SC-1 ~SC-3, SC-101~SC-103. SPEED COMPENSATION SWITCH
S1, S2, S8. ON AT PLAY
S4, S5, S3. ON AT RECORD.
S6, S7 SOUND ON SOUND SWITCH

PARTS LOCATION (PRE-AMPLIFIER)



PARTS LOCATION (MAIN-AMPLIFIER)



PARTS LIST

Ref. No.	Mtg. No.	Discription
	CABINET	
A1	R-S98031	Cabinet Main Complete
A2	R-468039a	Cabinet Trunk Only
		Leather for Trunk
	R-268220	Ornament Metal for Jack Window—2
	R-268231	Name Plate for Spec.
	R-278086b	Ornament Metal for Side Edge—2
	R-368059	Vinyl Tape for Side Edge
A3	R-268219	Metal Sash for upper and lower—(2)
		Nail 2.4ϕ-10—6
A4	R-88241	Handle Complete
A5	R-118588a	Mounting Metal for Handle
		Washer 4.5ϕ-10ϕ-0.8t—2
		Spring Washer 4ϕ—2
		Nut 4ϕ—2
A6	R-24887a	Handle Holder—2
A7		Polyethylene Washer—2
A8	R-12130a	Hinge Complete—4
		Plate Nut—4
		Screw 3ϕ-14—8
A9	R-12129a	Hinge Complete—2
		Nail 3.1ϕ-10—4
A10	R-44067	Leg—8
		Nail 3.1ϕ-13—8
		Washer 3ϕ—8
A11	R-32672a	Cover for Louver
		Nail 2.4ϕ-8—4
A12	R-118346	Special Washer—6
		Screw P.H 4ϕ-16—4
A13		Screw P.H 4ϕ-60—2
A14	R-S8733	Lid for small case complete
	R-39118a	Lid only
	R-12151	Plate Spring
	R-39267	Knob for OPEN
		Nail 2.3ϕ-4
		Washer 2ϕ
		Nail 3.10-10—2
	SPEAKER BOX	
B1	R-S98029	Speaker Box (Right) Complete
	R-4683036b	Speaker Box Wooden Only
		Leather
B2	R-268228	Metalic Adger for Front Box (Lower)
B3	R-268229	Metalic Adger for Front Box (Upper)
B4	R-268230	Metalic Adger for Front Box (Left Side)
B5	R-278085	Ornament Metal for Right Side
B6	R-368060	Adhesive Tape
B7	R-358010	Polyethylene Cover for Ornament Metal (Upper)
	R-358011	Polyethylene Cover for Ornament Metal (Lower)
B8	R-S81006a	Lock for S.P Box complete
	R-111848	Plate Nut for Lock
B9	R-S88220	Rear Lid Complete, Sticked Leather
	R-468038	Rear Lid Wooden Only
		Leather
		Nail 3.1ϕ-16—6
		Washer 3ϕ—6
	R-438011	Black Felt for S.P. Net
	R-368030	Accessories Bag (Contain 2 Couples Hook)
	R-218003	Badge for SANYO
	R-31582b	Panel for S.P Mounting
	R-24913	Inserted Screw—2
	R-44067	Leg—5
	R-128143	Hinge for S.P Box (Lower)—2
	R-111737	Plate Nut for Hinge—2
	R-S6879	Speaker
	R-S3008	S.P Cord Clamp
	R-S8942	S.P Cord Complete
		S.P Plug Molded
		S.P Cord
		Leather Ring
B10	R-S9830	S.P Box (Left) Complete
	R-468037a	S.P Box Wooden Only
		Leather
B11	R-268228	Metal Adge for Front Box (Upper)
B12	R-268229	Metal Adge for Front Box (Lower)
B13	R-268230	Metal Adge for Front Box (Right Side)
B14	R-278085	Ornament Metal for Left Side
B15	R-368060	Adhesive Tape

Ref. No.	Mtg. No.	Discription
	SPEKER BOX	
B16	R-358010	Polyethylene Cover for Ornament Metal (Lower)
	R-358011	Polyethylene Cover for Ornament Metal (Upper)
B17	R-S81006a	Lock for S.P Box Complete
	R-111848	Plate Nut for Lock
B18	R-S88220	Rear Lid Complete, Sticked Leather
	R-468038	Rear Lid Wooden Only
		Leather
		Nail 3.1ϕ-16—6
		Washer 3ϕ—6
	R-31582b	Panel for S.P Mounting
	R-24913	Inserted Screw
	R-438011	Black Felt for S.P Net
	R-368030	Accessories Bag (Contain 2 Couples Hook)
	R-44067	Leg—5
	R-128143	Hinge for S.P. Box (Lower)—2
	R-111737	Plate Nut for Hinge—2
MISCELLANEOUS		
	R-S6879	Speaker
	R-S3008	S.P Cord Clamp
	R-S8942	S.P Cord Complete
		S.P Plug Molded
		S.P Cord
		Leather Ring
	FUNCTION PANEL	
D1	R-31808a	Function Panel Only
	R-268211	Name Panel for Function Knobs
	R-398051	Cloth for Cabinet (Under Speed Change Lever)
	R-398088	Cloth for Cabinet (Under "POWER")
	R-118608a	Mounting Metal for Panel
	R-128032	Tape Guide
		Spring Washer 2ϕ
		Nut 2ϕ
D2	R-318082d	Deck Panel
	R-268188	Name Plate for Level Meter
	R-268189	Name Plate for "POWER", "MIC", & "STEREO PHONE"
	R-258030	Guide Pin for Head Housing
		Spring Washer 3ϕ—2
		Nut 3ϕ—2
	R-128097a	Plate Spring for Lid
D3	R-S88199	Lid Complete
	R-318084a	Lid for Record Lever and Volume Knobs
	R-268382	Name Plate for "OPEN"
	R-S88084	Hinge for Complete—2
	R-118495a	Hinge for Lid—2
	R-118496	Hinge for Lid—2
		Shaft for Hinge—2
D4	R-S88221	Knob Complete—4
	R-328055	Knobs for VR, TONE—4
	R-268222	Ornament Metal for Knob—4
	R-148173	Special Screw—2
D5	R-S88198	Head Housing Complete
	R-31803a	Head Housing
	R-26844	Ornament Metal
D6	R-S88197	Knob Complete—2
	R-328045	Knob for Volume—2
	R-268192	Ornament Metal—2
D7	R-288014b	Knob for Operation Lever
		Screw P.H. 4ϕ-20
D8	R-S2812a	Headphone Jack
D9		Screw O.H. 3ϕ-16—4
	R-24889	Special Ring—4
		Vinyl Chloride Washer 3.3ϕ-6.5ϕ - 0.5—4
		Screw, PH 3ϕ-12
D10		Speader Socket—2
D11		Screw PH 2ϕ-4—4
D12		Screw PH 2ϕ-6—4
	JACK & INSULATOR	
E1	R-268224	Name Plate for Right Side Jacks
E2	R-268553	Mounting Metal for Name Plate
E3	R-S2139	Socket for Speaker—2
E4		Fiber Washer 6.2ϕ-8.2ϕ-0.5t—2
E5		Polyethylene Washer 6.1ϕ-10ϕ-1t—2
E6	R-S4835	Slide Switch for Sound On Sound
		Screw OH 3ϕ-6—2

PARTS LIST

Ref. No.	Mtg. No.	Discription
		JACK & INSULATOR
		Spring Washer 3φ—2
E7	R-S2127	Plug for Voltage Selector
	R-S2133	Socket for Voltage Selector
		Screw OH 3φ-6—2
		Spring Washer 3φ—2
		Nut 3φ
E8		Screw PH 3φ-6—4
		Spring Washer 3φ—4
E9	R-268385	Name Plate for Left Side Jacks
E10	R-118636	Mounting Metal for Name Plate
E11	R-S2802	DIN Connector Socket
		Screw PH 3φ-6—2
E12	R-S2146a	Mounting Insulator complete for AUX, LINE OUT JACK—2
		Lug Plate 1-2 P
		Screw 3φ-8—4
		Washer 3φ—4
		Spring Washer 3φ—4
		Nut 3φ—4
		CAPSTAN MECHANISM
F1	R-S88106	Action Lever for Pinch Roller Complete
	R-118248	Action Lever Metal Plate Only
	R-248091	Spacer for Action Lever
	R-148087	Shaft for Lever Mounting
	R-148084	Pipe for Pinch Roller
	R-148086	Shaft for Pinch Roller
		Nut 3φ
		Spring Washer 3φ
	R-448064	Pinch Roller (W/Bearing)
	R-25223	Bearing for Pinch Roller
		Felt Ring 4 5φ-8φ-2t
		Nylon Washer 4.2φ-8φ-0.5t
		Looseless "E" Washer 3φ
F2	R-S88182	Cam Lever for Operation Complete
	R-118364	Cam Lever
F3	R-148090	Cam Roller
F4	R-148089	Fasten Shaft for Cam Roller
F5	R-148172	Fasten Shaft for REC. Lock Bar
F6	R-148088	Fasten Shaft
F7		Screw P.H. 3φ-10
		Nut 3φ
		Spring Washer-3φ
		Washer 3φ-10φ-1t
	R-246071	Spacer for Lever
F8	R-118251	Slide for Idler Lever Control
		Screw 3φ-10
		Nut 3φ
		Spring Washer 3φ
		Washer 3φ-10φ-1t
	R-24671a	Pipe for Slide
F9	R-158047	Coil Spring for Pinch Lever
		Vinyle Tube to Prevent Vibration
F10	R-S88107	Flywheel Complete
	R-288012	Flywheel
	R-128046	Shaft
		Steel Ball
F11	R-S88219	Bearing for Flywheel Complete
	R-248103	Bearing for Flywheel
	R-278082	Spacer
	R-118698	Mounting Metal for Bearing
		Screw P.H. 3φ-8—3
		Spring Washer 3φ—3
		Felt Ring 6φ-10φ-1t
		Felt 36φ×49φ×1t
		Rubber Ring 4φ-8φ-1t—2
		Nylon Washer 6.2φ-12φ-0.5t
		Nylon Washer 6.2φ-12φ-0.3t
		Fiber disk for Steel Ball
F12	R-148102	Special Screw for Spare Pulley
		Washer 2φ
		Spring Washer 2φ
		RECORDING MACHANISM
G1	R-S88243	Rec. Lever Complete (Left)
	R-118490	Rec. Lever
	R-118600	Reinforce Metal for Rec. Lever
G2	R-118491	Rec. Lever (Right)
G3	R-328047	Rec. Button—2

Ref. No.	Mtg. No.	Discription
		RECORDING MECHANISM
G4	R-148167	Rec. Lever Shaft
		Fiber Washer 4.5φ-2.3φ-0.8t—3
		Looseless "E" Washer 3φ—2
G5	R-148168	Special Screw—2
	R-138025	Coil Spring for Special Screw—2
		Nut 2.6φ—4
		Washer 2.6φ—4
G6	R-118487a	Lever for Slide Switch (Opposite side)
G7	R-118486a	Lever for Slide Switch (Near side)
G8	R-148074	Shaft for Lever—2
		Fiber Washer 4.5φ-16φ-0.8t—4
		Looseless "E" Washer 3φ—4
G9	R-118485	Mounting Metal for Levers (Upper)
G10	R-S88195	Mounting Metal Complete for Levers (Lower)
	R-118483	Mounting Metal for Levers
	R-118484	Mounting Metal for Printed Circuit Board
G11	R-118488a	Mounting Metal for Rec. Levers
G12	R-118509	Mounting Metal for Rec. Lock Bar
G13	R-148166a	Rec. Lock Bar
	R-158140	Coil Spring for Bar
	R-248208	Adjuster for Bar
		HEAD SYSTEM
J1	R-118262	Heads Mounting Base
	R-248098	Spacer-Heads Mounting Base—4
		Screw P.H. 3φ-12—4
		Spring Washer 3φ—4
J2	R-128094	Tape Guide
	R-128048	Tape Guide
		Nut 3φ-2
		Spring Washer 3φ-2
J3		Head Calibrate Screw P.H. 2φ-10—6
J4	R-158051	Head Spring for R/P & E Heads—6
J5	R-248099	Mounting Plate for Pad-Plates
J6	R-128051	Coil Spring for Pad-Plate E—3
	R-128052	Coil Spring for Pad-Plate R/P—3
	R-128047	Shaft for Pad-Plates
J7	R-248100	Pad-Plate for E Head
		Pad 5×10×2t
J8	R-258021	Pad-Plate for R/P Head
		Pad 5×10×2t
J9		Screw P.H. 2φ-4—2
		Spring Washer 2φ—2
		Washer 2φ-6φ-0.4t—2
J10	R-118263	Action Lever for Pad-Plates
	R-24679a	Spacer
		Screw P.H. 3φ—6
		Spring Washer 3φ
		Washer 3φ-8φ-0.5t
	R-158132	Coil Spring
RPH	R-S6837	Record/Playback Head
EH	R-S6838	Erase Head
	R-258046	Shield Plate
		OPERATION MECHANISM
K1	R-S88120	Brake Complete
	R-118270	Mounting Metal for Brake Band (Right)
	R-118271	Mounting Metal for Brake Band (Left)
	R-13072	Brake Band
	R-48106	Hide for Brake Shoe—2
		Rivet 2φ-4—4
		Screw 3φ-4—2
		Spring Washer 3φ-4—2
K2	R-118273	Brake Slide
K3	R-118274	Brake Adjuster
K4	R-24671a	Spacer for Slide (K2)
	R-24672a	Spacer for Lever (K9)
		Screw P.H. 3φ-8
		Screw P.H. 3φ-20
		Screw P.H. 3φ-6
		Spring Washer 3φ—3
		Washer Under Slide 3φ-10φ-1t
		Washer On Slide 3φ-8φ-0.5t
		Nut 3φ—2
K5	R-S88123	Cam for Operation Lever Complete
	R-118518	Cam for "PLAY" Mode (Upper)
	R-118278	Cam for Brake (Lower)
	R-148105	Spacer for Cams

PARTS LIST

Ref. No.	Mtg. No.	Discription
		OPERATION MECHANISM
		Screw P.H. 3φ-6—2
K6	R-148106	Shaft for Operation
K7	R-S88122	Lever for Spring Complete
	R-118279	Lever Only
	R-148107	Roller
	R-148089	Shaft
	R-24671a	Spacer for Lever
		Screw P.H. 3φ-10
		Nut 3φ
		Washer 3φ-10φ-1t
		Coil Spring for Lever
		Spring Washer 3φ
K8	R-S88311	Cam for Circuit ON/OFF Complete
	R-118842	Cam Metal Plate Only
	R-248173	Spacer for Cam
		Screw 3φ-5 P.H.
K9	R-S88121	Lever for Brake Acting Complete
	R-118272	Lever, Metal Plate Only
	R-148107	Roller for Cam
	R-148089	Shaft for Roller
	R-24671a	Spacer for Lever
		Screw P.H. 3φ-10
		Spring Washer 3φ
		Nut 3φ
		Washer 3φ-10φ-1t
K10	R-118275	Lever for REC Back Tension
	R-148104	Shaft for Lever
		Nut 3φ
		Spring Washer 3φ
		Looseless "E" Washer 3φ
	R-158044	Coil Spring for Lever
		Felt Attachment 8φ-11φ-1t
K11	R-S88116	Lever for FWD Transmitter Complete
	R-118205	Lever
	R-148107	Roller for Cam
	R-148089	Shaft for Roller
		Nylon Washer 5.2φ-11.5φ-0.3t
K12	R-128095	Bar for FWD Transmitter
		Sponge for Bar 13-30-10t
		Nut 2.3φ—2
K13	R-118266	FWD Action Lever
K14	R-148099	Shaft for Lever
		Nut 4φ
		Spring Washer 4φ
		Looseless "E" Washer
		Nylon Washer 6.2φ-12φ-0.5t—2
K15	R-148100	Shaft for FWD Idler Spindle
		Felt Ring for Shaft 5.5φ-14φ-2t
		Nylon Washer 5.2φ-12φ-0.5t
		Nylon Washer 5.2φ-7.8φ-0.5t
		Looseless "E" Ring 4φ
		Felt Ring 22φ-16φ-1t
K16	R-158046	Coil Spring for FWD Action Lever
K17	R-S88301a	FWD Idler Complete
	R-148259	Bearing
	R-278111	Wheel
		Felt Ring 12φ-18φ-1t
		Washer 4.5φ-8φ-1t
K18	R-S88110	Pulley for Rewinding Complete
	R-278048	Wheel
	R-228010	Bearing
	R-148101	Spacer
		Felt Ring 5.5φ-14φ-1t
		Nylon Washer 5.2φ-13.5φ-0.5t
		Nylon Washer 5.2φ-7.8φ-0.5t
		Screw P.H. 3φ-20
		Nut 3φ
		Spring Washer 3φ
		Washer 3φ-10φ-1t
K19	R-S88111a	Action Lever for REW Complete
	R-118268	Lever

Ref. No.	Mtg. No.	Discription
		OPERATION MECHANISM
	R-248101a	Spacer
		Looseless "E" Washer 4φ
		Nylon Washer 5.2φ-11.5φ-0.3t
K20	R-128096	Bar for REW Transmitter
		Sponge for Bar 13-30-10t
K21		Nut 2.3φ—4
		Washer 2.6φ-6φ-0.6t
K22	R-S88119	Lever for REW Transmitter Complete
	R-118269a	Lever
		Spacer
		Roller
		Shaft for Roller
		Looseless "E" Washer
		Nylon Washer 5.2φ-11.5φ-0.3t
K23	R-158045	Coil Spring for
K24	R-448055	Rubber Belt for REW
K25	R-148103	Shaft for Levers
		TAKE-UP & SUPPLY REEL DISK
L1	R-24865	Special Screw fcr Reel Disks Threaded Counter Clockwise—2
		Washer for Special Screw 4.7φ-7φ-0.5t —2
L2	R-S88115	Supply Reel Disk Complete
	R-348027	Supply Reel Disk, Baklite Only
	R-248097	Bearing for Supply Reel Spindle
	R-448006	Cushion for Supply Reel Disk
	R-118131	Guide Plate for Bezel pf Reel—3
		Felt Ring 38φ-50φ-1t
	R-348025	Pulley Under Supply Reel Disk, Groovy
	R-158004	Coil Spring for Slip System
	R-428060	Special Washer (Fiber)
	R-12199	Ring for Slip System—2
		Nylon Washer for Slip System 13φ-18φ-0.5t
L3	R-148098	Supply Reel Spindle
	R-24667a	Ring for Supply Reel Spindle
		Nut 4φ
		Spring Washer 4φ
	R-348026	Pulley aginst Tape Counter pulley
		Nylon Washer 5.2φ-11.5φ-0.5t
		Nylon Washer 5.2φ-11.5φ-0.3t
L4		Felt Ring 30φ×42φ×1t
		Washer 5.2φ×11.5φ×0.5t
		Nylon Washer 5.2φ×11.5φ×0.3t
L5		Nylon Washer 7.2φ-14φ-1t
	R-118258	Pushing Metal for Take-Up Pulley
	R-148096	Take-Up Reel Spindle Shaft
L6		Nut 4φ
		Spring Washer 4φ
L7	R-348023	Take-Up Pulley Groovy
	R-S88261	Take-Up Reel Complete
	R-348054	Take-Up Reel Disk
	R-248096	Bearing for Take-Up Reel
	R-448006	Cushion
	R-118055	Guide Plate for Bezel for Reel
	R-348055	Intermediate Pulley
	R-158131	Coil Spring
		Felt Ring 37φ×52φ×1t
		External "E" Ring 9φ
		Washer 10.5φ×16φ×0.8t
		Belt for Teke up
L8	R-S88114	Lever Complete
	R-118260	Push-Up Lever for Take-Up Reel Disk
L9	R-118261	Mounting Metal for Lever
	R-148097	Shaft
		Looseless Ring 2φ—2
		Screw P.H. 3φ-6—2
		Spring Washer 3φ—2
L10	R-118259	Mounting Metal for Lever
	R-148097	Shaft
		Looseless Ring
L11	R-158050	Coil Spring for Pushing Up Lever
L12	R-148192	Special Screw for Cam
		Spring Washer 4φ
		Nut 4φ

PARTS LIST

Ref. No.	Mtg. No.	Discription
		MECHANICAL DECK & CHASSIS
M1	R-118243a	Main Chassis Deck
M2	R-118244a	Intermediate Panel Chassis
M3	R-148085	Pouch Nut for Intermediate Panel Chassis
	-	Screw P.H. 4×8—4
	-	Spring Washer 4ϕ-4
M4	R-118247	Stopper for Cam Lever (F2)
	-	Screw P.H. 3ϕ-6—2
	-	Spring Washer 3ϕ—2
		AUTOMATIC STOPPER
N1	R-118587	Mounting Metal for Micro Switch
	-	Screw P.H. 3ϕ—2
	-	Spring Washer3ϕ—2
N2	R-128056	Lever for Automatic Stop
	R-14233	Shaft
	-	Nut 3ϕ
	-	Spring Washer 3ϕ
	-	Looseless "E" Washer
	R-241305	Pipe for Shaft
N3	R-S4836	Special Switch for Automatic Stop
	-	Screw P.H. 2.6ϕ-16
	-	Screw P.H. 2.6ϕ-14
	-	Spring Washer 2.6ϕ—2
	-	Nut 2.6ϕ
	-	Washer 2.6ϕ-7.5ϕ-0.5t
		SPEED CHANGER MECHANISM
P1	R-S88108	Speed Changer Idler Complete
	R-248111	Spacer
	R-118280	Wheel
	R-148259	Bearing
	-	Felt Ring for Idler 5.5ϕ-10ϕ-1t
	-	Nylon Washer 5.2ϕ-9.6ϕ-0.3t
	-	Felt Ring 16ϕ-22ϕ-5t
	-	Felt Ring 16ϕ-22ϕ-2t
	-	Nylon Washer 5.2ϕ-11.5ϕ-0.3t
	-	Nylon Washer 5.2ϕ-8ϕ-0.3t
	-	Washer 4.5ϕ×8ϕ×1t
P2	R-158048	Coil Spring for Pressing Idler
	-	Lug for Coil Spring
	-	Looseless "E" Washer 4ϕ—2
	-	Screw P.H. 3ϕ-35 for Coil Spring
	-	Spring Washer 3ϕ
	-	Nut 3ϕ
	-	Vinyl Tube 1ϕ-80
P3	R-S88109	Lever for Raising and Lowering Idler Complete
	R-148091	Idler Shaft
	R-118252	Lever for Idler
	R-148092	Connecting Shaft for Levers
	R-248092	Connecting Spacer for Levers
	R-118253	Lever for Speed Changer
	R-248093	Raising Spacer for Slide
	R-148093	Shaft for Acting, Under Levers
P4	R-398045	Raising Ring for Slide
P5	R-348045	Slide for Raising and Lowering Idler
	R-148095	Special Screw
	-	Nut 3ϕ
	-	Nut 4ϕ
	-	Spring Washer 3ϕ
	-	Spring Washer 4ϕ
	-	Polyethylene Washer 0.2ϕ-10ϕ-0.25t—2
	-	Washer 4ϕ-10ϕ-0.8t
	-	Screw P.H. 3×14
	-	Washer 3ϕ×10ϕ×1
P6	R-148094	Shaft for Lever
	-	Nut 4ϕ
	-	Spring Washer 4ϕ
	-	External "E" Ring
P7	R-158052	Coil Spring for Raising Lever
	-	Looseless "E" Washer 5ϕ
	-	Washer 6ϕ-13ϕ-1t

Ref. No.	Mtg. No.	Discription
		MOTOR
S1	R-S5168	Motor
S2	R-118560	Sheild Cylinder for Motor
S3	R-268367	Fan for Motor
S4	R-118561b	Sheild Panel Over Motor
	R-278088	Ring Spacer for Sheild Panel—3
	-	Spring Washer 4ϕ—3
	-	Nut 4ϕ—3
S5	R-278049e	Motor Pulley use in 60 Hz
	R-278050e	
	R-278051e	
	R-278052e	Motor Pulley use in 50 Hz
	R-278053e	
	R-278054e	
	-	Hadless set screw 3ϕ-8—2
	-	Hadless set screw 3ϕ-10—2
S6	R-C7006	Condenser for Motor
	-	Screw, P.H. 3ϕ-6—2
	-	Spring Washer 3ϕ—2
	-	Washer 3ϕ—2
		MISCELLANEOUS
	R-S5810	Tape Counter
		Screw P.H. 3ϕ-4—2
		Spring Washer 3ϕ—2
	R-448039	Rubber Belt for Counter
	R-118245	Mounting Metal for Counter
		Screw P.H. 3ϕ-6—2
		Spring Washer 3ϕ—2
	R-C7006	Motor Capacitor
		Screw P.H. 3ϕ-6—2
		Washer 3ϕ—2
		Spring Washer 3ϕ—2
	R-S4274a	Seesaw Switch (POWER)
	R-S4319	Slide Switch (Rec/Play)—2
	R-S4814	Rotary Switch (Speed Change)
	R-S5044	Pilot lamp 0.3V 0.2A
	R-S2814	Socket for Pilot Lamp
	R-261193a	Heat Sink for OSC Tr.
	R-41370	Insulator Plate for Power Tr.—4
	R-278095	Heat Sink for Power Tr.—4
	R-278096	Heat Sink for Power Tr.—4
	R-39320	Polyethylene Base for Power Tr.—8
S1, 2, 8	R-S4817	Spring Switch under Operation Lever
S3, 4, 5	R-S4817	Spring Switch under Recording Lever

Ref. No.	Discription
	SEMICONDUCTORS
Tr-1, 9	Transistors 2SB400
Tr-2, 3, 4, 10, 11, 12	Transistors 2SB303
Tr-5, 13	Transistors 2SB185
Tr-6, 14	Transistors 2SB187
Tr-7, 8, 15, 16	Transistors 2SB492
Tr-17, 18	Transistors 2SB405
D-1, 101	Diode 1S188 or 1S426G or 1N60
	Rectifier Diode DS-1P
TH-1, 2, 101, 102	Thermistor SDT-04

	RESISTORS		
R2, 102	Carbon P-Type	270 kΩ±10%	1/4W
R13, 113, 19, 119		56 kΩ±10%	1/4W
R21, 121		5.1 kΩ±10%	1/4W
R24, 124		20 kΩ±10%	1/4W
R7, 107		10 kΩ±10%	1/4W
R11, 111, 18, 118, 21, 121		6.8 kΩ±10%	1/4W
R14, 114, 54, 154		5.6 kΩ±10%	1/4W
R9, 109, 6, 106, 8, 108, 16, 116, 20, 120		4.7 kΩ±10%	1/4W
R25, 126		2.7 kΩ±10%	1/4W
R12, 112, 17, 117, 208		1.2 kΩ±10%	1/4W
R4, 104		910 Ω±10%	1/4W
R22, 122		620 Ω±10%	1/4W
R10, 110		100 Ω±10%	1/4W
R23, 123		15 Ω±10%	1/4W
R52, 152		10 Ω±10%	1/4W
R1, 101		2.7 MΩ±10%	1/4W

PARTS LIST

Ref. No.	Discription
RESISTORS	
R15, 115, 53, 5, 105, 153, 32, 132	Carbon P-Type 15 kΩ±10% 1/4W
R55, 155	3.3 kΩ±10% 1/4W
R29, 129	Carbon P-Type or Solid Type 33 kΩ±10% 1/2W (Solid) or 1/4W (Carbon)
R38, 138	15 kΩ±10% 1/2W 〃
R37, 137	10 kΩ±10% 1/2W 〃
R205	6.8 kΩ±10% 1/2W 〃
R39, 139	5.6 kΩ±10% 1/2W 〃
R36, 136	4.7 kΩ±10% 1/2W 〃
R42, 142	Solid or Carbon Type 3.9 kΩ±10% 1/2W (solid) or 1/4W (carbon)
R33, 133	2.7 kΩ±10% 1/2W (solid) or 1/4W (carbon)
R203	2.2 kΩ±10% 1/2W (solid) or 1/4W (carbon)
R34, 134	6.8 kΩ±10% 1/2W (solid) or 1/4W (carbon)
R51, 151	560 Ω±10% 1/2W (solid) or 1/4W (carbon)
R31, 131	470 Ω±10% 1/2W (solid) or 1/4W (carbon)
R40, 140	390 Ω±10% 1/2W (solid) or 1/4W (carbon)
R27, 127	270 Ω±10% 1/2W (solid) or 1/4W (carbon)
R49, 149	220 Ω±10% 1/2W (solid) or 1/4W (carbon)
R28, 128, 44, 144, 46, 146	33 Ω±10% 1/2W (solid) or 1/4W (carbon)
R41, 141	8.2 Ω±10% 1/2W (solid) or 1/4W (carbon)
R206	180 Ω±10% 1/2W (solid) or 1/4W (carbon)
R35, 135	3.3 kΩ±10% 1/2W (solid) or 1/4W (carbon)
R25, 125	Solid Type 1.8 kΩ±10% 1/2W
R30, 130	1.2 kΩ±10% 1/2W
R43, 143, 45, 145	1 kΩ±10% 1/2W
R202	47 Ω±10% 1/2W
R201	Carbon Type 82 Ω±10% 1L
R207	30 Ω±10% 2L (2W)
R50, 150	Special Ressitor 8 Ω 5W
R47, 147, 48, 148	1 Ω 1/2W
R204	24 Ω 5W

Ref. No.	Mtg. No.	Discription
CAPACITORS		
C13, 113, 25, 125		Mylar 0.04 μF 50WV ±20%
C12, 112		Mylar 0.03 μF 50WV ±20%
C9, 109		Mylar 0.05 μF 50WV ±20%
C23, 123		Mylar 0.0025 μF 50WV ±20%
C33, 133, 206		Mylar 0.002 μF 50WV ±20%
C3, 103		Mylar 0.0015 μF 50WV ±20%
C2, 102		Mylar 500 μF 50WV ±20%
C29, 129		Mylar 0.0075 μF 50WV ±20%
		Mylar 0.02 μF 50WV ±20%
C34, 134		Mylar 0.001 μF 50WV ±20%
C207		Ceramic 0.01 μF 250WV +80 −20%
C19, 119		Ceramic 0.04 μF 50WV +80 −20%
C10, 110		Ceramic 0.002 μF 50WV +80 −20%
C20, 120		Ceramic 0.0025 μF 50WV +80 −20%
C21, 121	R-C9802	Electrolytic 1 μF 15V
C201	R-C9128	Electrolytic 2000 μF 35V
C202	R-C9848	Electrolytic 1000 μF 25V
C203	R-C9801	Electrolytic 1000 μF 15V
C205, 30 130	R-C9127a	Electrolytic 500 μF 15V
C204	R-C9146	Electrolytic 200 μF 10V
C28, 128	R-C9143	Electrolytic 200 μF 6V
C16, 116	R-C9055a	Electrolytic 200 μF 3V
C8, 108	R-C9134	Electrolytic 100 μF 3V

Ref. No.	Mtg. No.	Discription
CAPACITORS		
C1, 101, C5, 105	R-C9137	Elcetrolytic 30 μF 6V
C8, 118	R-C9833	Electrolytic 5 μF 15V
C4, 104, C6, 106, C7, 107, C11, 111, C15, 115, C26, 126, C27, 127	R-C9131	Electrolytic 5 μF 6V
C17, 117	R-C9116	Electrolytic 0.5 μF 10V
C24, 124, C14, 114, C22, 122	R-C9126	Electrolytic 0.1 μF 10V
C32, 132	R-C9140	Electrolytic 0.3 μF 10V
TRANSFORMERS		
P.T.	R-W7829	Power Transformer
I.P.T.	R-W6824	Input Transformer
COILS		
L1, 101	R-W6818a	Choke Coil (Hum Back)
L2, 102	R-W1808	Choke Coil 3.3 mH
L3, 103	R-W1812	Choke Coil 2.2 mH
L201	R-W1816	Choke Coil 1.2 mH
OSC	R-W8804a	Oscillator Coil
HEADS		
EH	R-S6838	Erasing Head
RPH	R-S6837	Record/Playback Head
VARIABLE RESISTORS		
VR1, 101	R-R124158	VR 10 kΩ A Rec. Level Control
VR2, 102	R-R124189	VR 10 kΩ A Tone Control
VR3, 103	R-R124820	VR 20 kΩ B Loudness Control
SEMI-FIXED RESISTORS		
SVR1, 101	R-R11013	SVR 10 kΩ B Gain Adjustment
SVR2, 102	R-R110812	SVR 20 kΩ B Meter Adjustment
MISCELLANEOUS		
	R-S5536	VU Meter—2
	R-S1044	Fuse UL Approved 1A
	R-S3007	Lug Plate 1-4p
	R-S3005	Lug Plate 1-3p
ACCESSORIES		
		AC code is chosen among following A, B, C & D
A	R-S1076a	Plug, English-Type 3-Pin 3-Wired code Rubber Cushion
	R-S1245	Plug, Australia-Type 3-Pin
B		Vinyl 2-Wired Cord
	R-S1817	Plug, Siemens-Type, 2-Pin
C	R-S1076a	3-Wired cord Plug, Photex-Type, 3-Pin Plug, English-Type, 3-Pin
D	R-3134	AC cord 6A 250V
	R-S8574b	AC adaptor, Siemens-Type, 2-Pin
	R-S8575b	AC adaptor, English-Type, 2-Pin
	R-S6867	Microphone Imp. 10kΩ
	R-31304b	Empty Reel "7"
	R-S88275	Recording Tape "7" Splicing tape
	R-S88017	Shield cord (RCA plug-clip)
	R-39054	Microphone Stand—2 Reel Stopper—2
PACKINGS		
	R-498200	Djsplay Box W/Fillers (R-498201, R-498202a, R-498212a)
	R-478131	Instruction Booklet
	R-358012b	Polybags

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